ADVANCED MICROECONOMICS

1. Aims and Coverage of the Course.

Microeconomics pictures the economy as a collection of agents making supply and demand decisions in order to further their own interests. The collective outcomes of these decisions determine the properties and behaviour of the economy.

Consequently, this course provides an account of: (i) the microeconomics of agents in the economy; and (ii) the microeconomics of the economy as a whole that follows from what the agents in the economy are up to. This is done using, as an over-arching framework and point of reference, possibly the most fundamental model in economics, namely the Arrow and Debreu model. The course also considers various tests of microeconomic theory – something curiously lacking in most textbooks – along with illustrative applications of microeconomic theory to international trade and finance. Some extensions and generalizations of Arrow-Debreu microeconomics are also presented. The ultimate aim of the course is to fire student interest, enquiry, and learning in microeconomics, by providing an integrated, accessible, rigorous, carefully motivated, relevant and empirically referenced account of advanced microeconomics.

One of the complaints that students sometimes make about their experience in microeconomics courses is that microeconomics ‘appears to be a disjointed collection of topics’ and that it lacks ‘a unifying context and narrative’. From the title page on, this course makes an implicit claim that the presentation and student experience of microeconomics needn’t be like that. This is so because there exists a deep, unifying and beautiful context for the field of microeconomics in the form of the Arrow-Debreu model of general equilibrium. John Geanakoplos (2008) has recently remarked that: “[i]t is not easy to separate the significance and influence of the Arrow-Debreu model of general equilibrium from that of mathematical economics itself”. In fact it is reasonable to argue that the Arrow-Debreu model – along with its extensions and generalizations – forms the bulk of theoretical economics. Geanakoplos, John. “Arrow-Debreu model of general equilibrium.” The New Palgrave Dictionary of Economics. Second Edition. Eds. Steven N. Durlauf and Lawrence E. Blume. Palgrave Macmillan, 2008.

The Arrow-Debreu model pictures the economy as a collection of economic agents (traditionally identified as ‘consumers’ and ‘producers’), who make supply and demand decisions in an environment of complete markets, with the aim of furthering their own interests. Locating the economic agents in an Arrow-Debreu context leads naturally to a detailed discussion of consumer and producer behaviour in such a decision making environment. It also sets the scene for various extensions and generalizations of Arrow-Debreu consumer and producer theory that are treated later in the book. As well it provides an early glimpse at ‘the ultimate purpose’ of consumer and producer theory, which is to help us to better understand the behaviour of the economy as a whole.

With the Arrow-Debreu context for our work in place, outlining the field of microeconomics, and the institutional features of the Arrow-Debreu model becomes the natural subject matter for LECTURE 1.

Developing the microeconomic theory of consumers and producers in a complete market Arrow-Debreu economy follows as the subject matter of LECTURES 2, 3, 4 and 5.
LECTURES 6, 7, 8 and 9 develop the properties of the economy that flow from the underlying microeconomics of the agents in it.

LECTURE 10 considers some applications of Arrow-Debreu microeconomics. One of the surprising things discovered by readers in the applications section is that a great deal of what passes for ‘standard economics’ (e.g. the gains from international trade proposition, some basic results in finance), are highly conditional, and in fact conditional on the world looking a lot like the Arrow-Debreu model of the economy.

LECTURE 11 is motivated by the observation that economics not only has a duty to formulate theories about economic phenomena, but it also has a duty to test those theories. Curiously, at least to me, this step in the ‘scientific method’ is (with one partial exception), never embraced in graduate (or undergraduate) microeconomics texts. The partial exception is Chapter 12 in H. R. Varian, *Microeconomic Analysis* where a brief outline of some the methods for evaluating and testing Arrow-Debreu consumer and producer theory (but not of other aspects of Arrow-Debreu microeconomics, such as the market clearing hypothesis), is given. However, even in that very good book, and in the context of his discussion of microeconometrics, Varian (1992, Ch12) fails to give students any indication of the outcomes of such tests as have been conducted and reported in the literature. This is a major omission from all currently available graduate texts in microeconomics.

LECTURES 12 and 13 provide a treatment of the microeconomics of uncertainty, both at the individual economic agent level and at the level of the economy as a whole. Together they provide a theoretical foundation for the burgeoning field of financial economics.

In LECTURE 14 some initial steps are taken in the direction of relaxing some of the structural features of the Arrow-Debreu model. Relaxation of features such as ‘the complete markets assumption’, the ‘finitely many agents condition’, the ‘price mediated trading rule’ and ‘the price taking postulate’ are considered. Some of what happens to the microeconomics of agents in the economy and to the properties of the economy as a whole when these conditions are relaxed is considered in this final lecture.

The entire presentation of microeconomics given here is made in the context of and with reference to the Arrow-Debreu model. Hopefully this will give you as students the sense that far from being a ‘disjointed series of topics’, advanced microeconomics is in fact a coherent collection of mutually supporting ideas. Using the Arrow-Debreu model as the explicit framework for our presentation of microeconomics also has a pedagogic advantage because students will generally experience fewer feelings of being lost in any particular argument, because the big picture context of the model can always be referred to in order to see where any particular argument is ultimately heading.

2. Textbook and References.

The textbook for the course is:

**Reference** will also be made from time to time to the following works:


Durlauf, S. N. and L. E. Blume (2008) eds., *The New Palgrave Dictionary of Economics*, (2nd Edition) London: Palgrave-Macmillan. This is abbreviated throughout this reading list as *NPDE2*. It is available on-line through the generosity of the University Library and the agitation of former Honours and Masters students and some Faculty members.


3. **Tutorials.**

For details see the separate Tutorial handout.

4. **Assessment.**

**Assignment 1: Tutorials**

You need to submit *any ten* (10) of the twelve (12) Tutorials in the course. These will be marked on the basis $S^+$ (‘Satisfactory plus’ = 2 marks), or $S$ (‘Satisfactory’ = 1 mark) or $S^-$ (‘Satisfactory minus’ = 0 marks). The maximum value of the Tutorials is 20 marks.

**Assignment 2 : Essay**

The essay topic should be in your hands by now. Submit the essay by the due date, which is: @ the beginning of the second last Lecture in the course. The total value of the Essay is 20.
Assignment 3: Final exam

For ECON490 (i.e. Honours students) taking this course, there will be two (2) three hour (3 hr) final exams in this subject (details of the structure and content of the examination will be supplied nearer the time).

For ECON860 (i.e. Masters students) taking this course, there will be one (1) three hour (3hr) final exam (details of the structure and content of the examination will be supplied nearer the time). A copy of the examination paper is provided for you.

The arithmetic of assessment is as follows: Exam is worth 60 marks, Tutorials are worth 20 marks, Essay is worth 20 marks. Final grade expressed out of 100.

Coarse Diary¹

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FIRST WEEK OF EXAMINATIONS
SECOND WEEK OF EXAMINATIONS

All the best and I hope you learn something from the course.

¹ “Misspelling” intended because this dairy is intended to be a rough guide to the rate at which I think we will progress through the material. However, it will not be adhered to at the expense of your understanding. If something is taking a bit longer to deal with than is envisaged in this diary (or if we get through some topic faster than I imagined we would), then so be it. Your learning is what matters here, not a regimented march through the subject.
COURSE OUTLINE

**Lecture 1**: Microeconomics and the Arrow–Debreu model.

**Lecture 2**: Arrow–Debreu Consumers I (Choice).

**Lecture 3**: Arrow–Debreu Consumers II (Demand).

**Lecture 4**: Arrow–Debreu Consumers III (Duality and Revealed Preference).

**Lecture 5**: Arrow–Debreu Producers.

**Lecture 6**: The Existence of equilibrium.

**Lecture 7**: Uniqueness and Stability of equilibrium.

**Lecture 8**: Comparative Statics of equilibrium.

**Lecture 9**: Optimality and the Welfare Theorems.

**Lecture 10**: Some applications of Arrow–Debreu general equilibrium theory.

**Lecture 11**: Testing Arrow–Debreu general equilibrium theory.

**Lecture 12**: Arrow–Debreu and Uncertainty I (Choice).

**Lecture 13**: Arrow–Debreu and Uncertainty II (GE and Finance).
Lecture 1 Introduction, motivation and the Arrow-Debreu model

1.1 The Field of Microeconomics

See Journal of Economic Literature 'Classification System' for Articles and is available at http://www.aeaweb.org/journal/jel_class_system.php

This standard classification may give you some idea of the scope of the subject.

1.2 The Framework of Microeconomics


Very brief introduction to and overview of the nature and structure of Microeconomics.

D. Kreps (1990), *A Course in Microeconomic Theory*, Harvester-Wheatsheaf, Ch. 1.

Introduces the “Actors, behaviour, institutions and outcomes” picture, which can be a very useful organising device.


Gives an overview of Microeconomics with particular emphasis on the environment in which agents are imagined to be operating and introduces some of the available equilibrium concepts by which their behaviour might be modelled.


No this is not typo – he actually called the paper this. It is worth reading for the elegance of expression alone – but also for the context it gives to the study we are about to undertake.

1.3 Methodology and Scientific Method


Introduces the idea that Microeconomics exploits the information contained in the maximisation hypothesis to make predictions about the comparative statics of economic agents, (‘the Samuelson program’).


Useful summary of basic scientific method.

Presents an interesting perspective on 'testing the theory'.

1.4 The Framework of the Arrow-Debreu Model


Very brief introduction to the A-D model and the field of general equilibrium theory.


A very useful guide to the Arrow-Debreu model. At this stage it is probably easiest for you to read just the first three pages and glance at the rest. You might like to retain the article as a map of where we are going.

**Lecture 2 Arrow-Debreu Consumers I (Choice Theory)**


This introduces the basic notions of “commodity”, “preference relation”, “budget set” and “utility function”.


This section presents a nice discussion of the classic Sonnenschein theorem on choice without transitivity. Such discussions are hard to find outside the research literature and this one in particular would repay careful study.


Nice discussion of an interesting (and widespread?) class of preferences.

**Lecture 3 Arrow-Debreu Consumers II (Demand Theory)**


This section presents some of the basic results which make up neo-classical or Arrow-Debreu consumer demand theory.


Gives a very nice, compact treatment of demand theory via what we have called the ‘primal’ approach. Includes a neat derivation of the Slutsky equation. See also pp. 36 – 38 for a discussion of the remarkable Mitiushin-Polterovich theorem.
M. Blad and H. Keiding (1990), Ch. 2.

Defines the notion of a “consumer”; writes down neoclassical choice theory and derives the comparative statics of neoclassical consumers acting in an Arrow-Debreu environment.

Lecture 4 Arrow-Debreu Consumers III (Duality and Revealed Preference Theory)


Presents information about the Slutsky matrix and also introduces the Weak Axiom of Revealed Preference (and optionally the Strong Axiom of Revealed Preference).


Gives a thorough and uncluttered account of the revealed preference approach.


This introduces the “Duality” approach to consumer theory. There are in a sense no new results here, but there are number of new techniques which are now pervasive in economic analysis.


Discusses the dual approach to consumer demand. Note there are some notational differences between the approach of McKenzie and that of Mas-Collell et. al., Varian and co.

V. Bohm and H. Halker (2008), "Demand theory", (in) NPDE2.

Compliment to Mas-Colell, Whinston and Green and gives a very complete (reference level) account of consumer choice and demand theory.


A nice account of Arrow – Debreu consumer theory.

Lecture 5 Arrow-Debreu Producers

An account of Arrow-Debreu producer theory from the “Primal” and “Dual” points of view.

M. Blad and H. Keiding (1990), Ch. 3.

Presents the theory of production in an Arrow-Debreu environment from the set theoretic, production function and dual points of view. Notice the attention given to the question of the existence of profit maximising decisions.

G. Debreu (1959), *Theory of Value*, Ch. 3.

Classic and fairly easy to follow treatment of firm behaviour in an Arrow-Debreu environment written by the second part of the famous team.


A nice presentation of producer theory from the ‘primal’ point of view.


Surveys producer theory with particular emphasis on the duality between production, cost and profit functions. Also contains some interesting material on ‘empirical testing’ that we will return to later in the course.

**Lecture 6 Existence of Market Equilibrium**


Introduction to the basic existence question for market or Walrasian equilibrium.


Gives an account of an approach to the existence question, originally due to Arrow and Hahn (1971), which exploits the properties of the excess demand map in an Arrow-Debreu economy to achieve an existence result. Note that Varians’ approach appears to be for the exchange case, but as we will see in the lectures, it easily generalises to the production case.


Also comes at the existence problem from the “excess demand end”.

M. Blad and H. Keiding (1990), pp. 156-162.

Existence from the “primitives” point of view.


A nice account of the existence problem which allows you to get a feel for what has to be assumed about the primitives of the economy if an existence argument is to go through.


This is a critical survey of the available sufficient conditions for the existence of market equilibrium, in particular the conditions which appear in the ‘third level’ proofs of the equilibrium existence theorem. The paper also discusses an apparently little known necessary condition due to Arrow and Debreu (1954) as well as providing an introduction to the recent and emerging literature on necessary and sufficient conditions for the existence of market equilibrium.


Has an extensive discussion of issues associated with the existence of competitive equilibrium. Also discusses in detail some of the issues discussed in Bryant (1997).

A. Mas-Colell, M. Whinston and J. Green (1995), pp. 598-606 (optionally Chapter 4.)

A fundamental result which tells us something about the “aggregate” implications of Arrow-Debreu Microeconomics and also conditions the search for conditions which yield Uniqueness, Stability and Comparative Static properties of market equilibrium.


Nice treatment of the classic Sonnenschein-Mantel-Debreu theorem, which apart from being interesting in its own right, underpins a lot of the work to be discussed in the sections to follow.


Contains a discussion of the properties of market demand functions that is slightly more accessible than that presented in Mas-Colell, Whinston and Green (1995).

W. D. A. Bryant (2010), Ch 2 and 3.

Presents more detail on sufficient, necessary and necessary and sufficient conditions for the existence of equilibrium. Recommended reading only if you are having trouble sleeping!

**Lecture 7 Uniqueness and Stability of Market Equilibrium**

Presents a thorough analysis of the conditions needed for uniqueness (and local uniqueness) and does so from a number of “angles”. Also gives a thorough account of the remarkable ‘Sonnenschein-Mantel-Debreu Theorem’.

M. Blad and H. Keiding (1990), pp. 162-166.

Gives a nice introduction to the “conditions on excess demand functions” approach to the uniqueness question.


Presents a reasonably accessible summary of the modern “index analysis” approach to the uniqueness question.


Provides a unified view of some relatively recent work on the uniqueness of equilibrium.

W. D. A. Bryant (2010), Ch 7.

Gives an overview of the uniqueness problem, particularly in a production context – and suggests a potentially new approach to getting uniqueness conditions via contraction mappings.


Interesting account of price and quantity adjustment processes.


Are there forces at work in the economy that will take the prevailing price vector to equilibrium, supposing that one exists? This is the “stability question” for market equilibrium and in these pages Blad and Keiding present an introduction to the field of answers to this question.


Gives an account parallel to that in Blad and Keiding for the first few pages, but then introduces the important 'Non-Tatonnement' adjustment processes.

In teresting discussion of the stability problem. Also, if you get interested in this problem, then a place where you might start a serious study is Hahn (1982), both for details about known results and for 'attitude'.


This is an extremely important paper in the Stability literature. A summary of the main conclusion will be presented in lectures.


Provides a unified treatment of numerous important issues in stability analysis.

W. D. A. Bryant (2010), Ch 8.

Provides a discussion of the stability properties of some tatonnement, non-tatonnement and ‘agent driven’ adjustment processes, in a GE context.

**Lecture 8 Comparative Statics of Market Equilibrium**


What happens to (equilibrium) prices and quantities if the economy is “shocked” (≠ morally outraged) by a variation in the parameters which define it, in particular, tastes, endowments and technologies? This is a fundamental applied issue and also one of considerable theoretical and “methodological” significance.


If we are serious about the “Samuelson-program” and also if we want to make bread and butter predictions about the effects on prices and quantities traded of various parameter changes, then we need to be able to extract from our multi-market models, so called comparative static predictions. Blad and Keiding give an introduction to the circumstances in which this might be possible.

J. Nachbar (2010), "Comparative Statics" *NPDE2*.

Excellent survey of what is involved in obtaining comparative static results in disaggregated systems.


Ties up a number of the issues associated with comparative statics in GE systems as well as providing an introduction to some of the emerging modern techniques for tackling this task.

When does price taking behaviour make sense and what precisely is meant by the term “competitive”? A fundamental result due to Aumann answered these questions and that answer and the associated extensions is presented here.

W. D. A. Bryant (2010), Ch 10.

Discusses the major approaches to, and results for, comparative statics in a GE context.

**Lecture 9 Optimality of Market Equilibrium and the Welfare Theorems**

A. Mas-Colell, M Whinston and J. Green (1995), (background: pp. 515-525; see also the course notes.)

Provides the geometric intuition for what is going on with the Welfare Theorems.


Extensive account of the First and Second Fundamental Theorems of Welfare Economics.

M. Blad and H. Keiding (1990), Ch. 4.

Market or Walrasian equilibrium might be an interesting solution concept for certain abstract games and even a way of understanding market prices, trades and sometimes a vehicle for obtaining comparative static predictions. Possibly even more interesting is the fact that under certain conditions Walrasian equilibrium decentralises a Pareto optimal allocation. This chapter deals with the optimality of equilibrium.

G. Debreu (1959), Ch. 6.

Classic treatment of the first and second fundamental theorems of Welfare Economics. Note in particular the hypotheses and conclusions of these theorems.


Gives a very nice account of the Welfare theorems and their context.


The informal and semi-formal literature which interprets the SFTWE often claims more than the theorem does. “Support” is not analogous in English to “achieve”. This distinction matters when policy design is considered.


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An interesting and insightful discussion of the optimality principle that has come to dominate thinking about welfare economics, at least at the undergraduate level.

W. D. A. Bryant (2010), Ch 9.

Discusses both the First and Second welfare theorems. Explores some circumstances where they hold and also some circumstances where they fail.

**Lecture 10 Some Applications of the Arrow-Debreu Model**

This LECTURE aims to show that far from being an arcane piece of theory, Arrow-Debreu microeconomics informs a great deal of economic analysis – both ‘pure’ and ‘applied’.

**Application 1:** The first application involves a relatively careful analysis of *The Gains from Trade Proposition*.


There are numerous applications of Arrow-Debreu model. Here Kemp shows how the model underpins standard “gains from trade” arguments.


This paper provides an in depth look at the propositions which constitute the gains from trade proposition in international trade.


**Application 2:** The second application involves studying the fascinating subject of *Picemeal reform*. This approach to economic policy formulation turns out to be widely applicable to task of finding welfare improving policies. This LECTURE provides a discussion of the foundations of the approach in Arrow-Debreu microeconomics, along with some applications.


Presents an introduction to the tax and tariff reform literature which uses the Arrow-Debreu model as its laboratory.


Advanced contribution to the Arrow-Debreu tariff reform literature, which relaxes some of the assumptions previously made in the literature.


Application 3: In LECTURE 8 on Comparative Statics, we developed a general expression for the variation in prices associated with particular changes in the parameters that define the economy. One such parameter is the size, composition and distribution of endowments among consumers in the economy. It is of some interest to study what happens when agents are transferred between agents.

Our third application of Arrow-Debreu microeconomics therefore considers endowment transfers, endowment manipulation and The Transfer Problem and the transfer paradox. Academic interest in the transfer problem, grew out of a debate between Ohlin and Keynes about the likely effects of post WW1 German reparations. Here we outline the classic transfer problem and explore the various ‘manipulation via endowments’ results that have appeared in the literature.


Presents a nice account of the so-called 'Transfer Paradox', which although it appears to be a highly academic question, actually has historical antecedents in the debates (between Keynes and Ohlin among others) about the appropriate size of post WW1 German reparations. Can be applied in many contemporary situations also.


**Application 4:** Our fourth application is to **optimal taxation**.


**Application 5:** One of the parameters that defines an Arrow-Debreu economy is the number of economics agents in it. One way in which that number can vary is via migration. The effects of migration on the equilibrium and welfare of an economy is our fifth application.


**Application 6:** Thanks to a result known a Sperner’s Lemma, is a close relative of Brouwer’s Fixed Point Theorem, it is possible to compute Arrow-Debreu prices (and quantities). Our sixth application
will explore and explain some of what is involved in the computation of equilibrium prices and quantities.


Lecture 11 Testing Arrow-Debreu Theory


Interesting discussion of the testing in an economics context.

(Testing Arrow-Debreu Consumer Theory)


Presents a summary of the outcome of testing Neoclassical consumer demand theory and some background material on how to conduct such tests.


Presents a test of Neoclassical consumer demand theory using the AID demand system and draws attention to the contrast between results for aggregate and individual data.

An important development in the methodology of testing A-D consumer theory is presented here along with an interesting empirical application.


A non-parametric test of consumer theory.


Falsification of nontrivial empirical statements, of a statistical nature or not, is basically destructive. No wonder that it is rarely practiced. Rather than then abandoning a rejected null hypothesis, one tries to salvage it by looking for reasons why the rejection of an otherwise credible, plausible hypothesis occurs. One then attempts to modify the set-up in such a manner that formal rejection is avoided. Testing, in general, but specifically of nonnested hypotheses, can be seen as a kind of model selection. These issues are illustrated with examples from applied demand analysis: the testing of the homogeneity condition and of Slutsky symmetry and the choice of functional form for demand systems.


Provides a survey of tests of consumer theory.

(Testing Arrow-Debreu Producer Theory)


Tests Neoclassical producer theory by exploiting consequences of various dual equivalence’s.


Cleverly does (at least) two things: (i) See's how well the standard price taking, profit maximising model of the firm performs as far as predicting how firms will react to changes in their economic environment and (ii) check to see how different this behaviour is from that which one observes in firms which have objectives other than straight profit maximisation. Also claims to be doing this work without appeal to restrictive assumptions about returns to scale.


An interesting discussion of some basic issues in the econometrics of testing producer (and consumer) theory.
W. D. A. Bryant (2010), pp. 377 – 86

Provides a survey of tests of producer theory.

**Testing The Market Clearing Hypothesis**


Tests the Walrasian-equilibrium hypothesis using a disaggregated model of the US economy and aggregate data.


Considers the possibility of disequilibrium on markets due to various sorts of indivisibilities. Also presents some informal evidence in this direction.


Presents some empirical evidence derived from tests of market clearing.

**Lecture 12 Arrow – Debreu and Uncertainty I (Choice Theory)**


Detailed introduction to the theory of individual behaviour under uncertainty, including a review of some of the modern developments in the field.

D. Kreps (1990), Ch. 3.

There are many ways to model the choice, by an individual, of an action when there is an uncertain connection between any particular action and the resulting outcomes. Kreps provides an introduction and useful discussion of one of the most heavily investigated models of choice under uncertainty, that due to von Neumann and Morgenstern.


Provides a very nice treatment of choice under uncertainty.

**Lecture 13 Arrow – Debreu and Uncertainty II (General Equilibrium and Finance)**

G. Debreu (1959), Ch.7.
Provides a classic treatment of the results obtainable about an economy in which there is a complete set of contingent markets.


Gives a thorough account of the advanced topic of “general equilibrium under uncertainty”. Considers the existence question in some non Arrow–Debreu environments.


Considers the GE implications of uncertainty and market incompleteness. One of the co-authors is a founder of the field.


Summary and Revision


A delightful summary of much of what we have seen, presented with flair and great “attitude”.

W. D. A. Bryant (2010), Ch 12.

An attempts a reflection on some of what GET has to teach us.